Dr. Vasantraodada Patil Shetkari Shikshan Mandal's

PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, BUDHGAON, SANGLI- 416304.

An Autonomous Institute

Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

(Accredited by NAAC)

Department of Basic Sciences and Engineering

Curriculum for First-Year Undergraduate Degree Programme (B. Tech.)

(Common to All Branches)

In accordance with the *National Education Policy (NEP) 2020*, including curriculum structure and evaluation scheme

Effective from Academic Year 2025–2026

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Department of Basic Sciences and Engineering

Curriculum Structure and Evaluation Scheme

(Academic Year 2025-26 Onwords)

F.Y. B.Tech **SEMESTER I** **Physics Group** **Group A**

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					TOTAL
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
Students Induction Program As Per AICTE Guidelines											
0BSBS101	Engineering Mathematics-I	3	1	0	4	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSBS102	Engineering Physics	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES103	Engineering Graphics	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES104	Basic Electrical and Electronics Engineering	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSIK105	Indian Epistemology	2	0	0	2	ISE	50	20	-	-	50
0BSAE106	Professional Communication Skills	2	0	2	3	ISE	-	-	50	20	50
0BSBS107	Engineering Physics Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES108	Engineering Graphics Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES109	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSVS110	Workshop Practices	0	0	2	1	ISE	-	-	50	20	50
TOTAL		**14**	**1**	**10**	**20**	**TOTAL MARKS**					**700**
Total Contact Hours Per Week		**25**									

Course Category	Basic Sciences Course	Engineering Science Course	Vocational and Skill Enhancement Course	Ability Enhancement Course	Indian Knowledge System	Co – curricular Courses	Total
	BS	ES	VS	AE	IK	CC	
Credit	8	6	1	3	2	0	20

ISE 1:-In semester evaluation 1, ISE 2:- In semester evaluation 2, MSE: - Mid Semester Examination, ESE: - End Semester Examination.

***Passing Cretria :- ISE + MSE + ESE ≥ 40 % Marks and ESE has sepearte passing ≥ 40 % Marks.**

Dr.Anushka A. Patil
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Dean Academics

Dr. S. S. Mohite
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Prof. R. A. Kanai
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Zeroth Revision

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Curriculum Structure and Evaluation Scheme

(Academic Year 2025-26 Onwords)

F.Y. B.Tech **SEMESTER I** **Chemistry Group** **Group B**

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
Students Induction Program As Per AICTE Guidelines											
0BSBS101	Engineering Mathematics-I	3	1	-	4	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSBS111	Engineering Chemistry	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES112	Engineering Mechanics	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES113	Basic Civil and Mechanical Engineering	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSCC114	Integrated Personality Development	1	0	0	1	ISE	50	20	-	-	50
0BSES115	Programming for Problem Solving in C	2	0	2	3	ISE	-	-	50	20	50
0BSVS116	Design Thinking	1	0	2	2	ISE	-	-	50	20	50
0BSBS117	Engineering Chemistry Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES118	Engineering Mechanics Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES119	Basic Civil and Mechanical Engineering Laboratory	0	0	2	1	ISE	-	-	50	20	50
TOTAL		14	1	10	20	TOTAL MARKS					700
Total Contact Hours Per Week		25									

Course Category	Basic Sciences Course	Engineering Science Course	Vocational and Skill Enhancement Course	Ability Enhancement Course	Indian Knowledge System	Co –curricular Courses	Total
	BS	ES	VS	AE	IK	CC	
Credit	8	9	2`	-	-	1	20

ISE 1:-In semester evaluation 1, ISE 2:- In semester evaluation 2, MSE: - Mid Semester Examination, ESE: - End Semester Examination.

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Curriculum Structure and Evaluation Scheme

(Academic Year 2025-26 Onwords)

F.Y. B.Tech **SEMESTER II** **Physics Group** **Group A**

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0BSBS120	Engineering Mathematics-II	3	1	0	4	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSBS102	Engineering Physics	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES103	Engineering Graphics	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES104	Basic Electrical and Electronics Engineering	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSIK105	Indian Epistemology	2	0	0	2	ISE	50	20	-	-	50
0BSAE106	Professional Communication Skills	2	0	2	3	ISE	-		50	20	50
0BSBS107	Engineering Physics Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES108	Engineering Graphics Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES109	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSVS110	Workshop Practices	0	0	2	1	ISE	-	-	50	20	50
TOTAL		**14**	**1**	**10**	**20**	**TOTAL MARKS**					**700**
Total Contact Hours Per Week		**25**									

Course Category	Basic Sciences Course	Engineering Science Course	Vocational and Skill Enhancement Course	Ability Enhancement Course	Indian Knowledge System	Co – curricular Courses	Total
	BS	ES	VS	AE	IK	CC	
Credit	8	6	1	3	2	0	20

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Curriculum Structure and Evaluation Scheme

(Academic Year 2025-26 Onwords)

F.Y. B.Tech **SEMESTER II** **Chemistry Group** **Group B**

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0BSBS120	Engineering Mathematics-II	3	1	-	4	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSBS111	Engineering Chemistry	3	0	0	3	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES112	Engineering Mechanics	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSES113	Basic Civil and Mechanical Engineering	2	0	0	2	ISE 1 MSE ISE 2 ESE	10 20 10 60	40*	-	-	100
0BSCC114	Integrated Personality Development	1	0	0	1	ISE	50	20	-	-	50
0BSES115	Programming for Problem Solving in C	2	0	2	3	ISE	-	-	50	20	50
0BSVS116	Design Thinking	1	0	2	2	ISE	-	-	50	20	50
0BSBS117	Engineering Chemistry Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES118	Engineering Mechanics Laboratory	0	0	2	1	ISE	-	-	50	20	50
0BSES119	Basic Civil and Mechanical Engineering Laboratory	0	0	2	1	ISE	-	-	50	20	50
TOTAL		**14**	**1**	**10**	**20**	**TOTAL MARKS**					**700**
Total Contact Hours Per Week		**25**									

Course Category	Basic Sciences Course	Engineering Science Course	Vocational and Skill Enhancement Course	Ability Enhancement Course	Indian Knowledge System	Co - curricular Courses	Total
	BS	ES	VS	AE	IK	CC	
Credit	8	9	2`	-	-	1	20

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Curriculum including Structure and Evaluation Scheme

To be implemented from Academic Year 2025-26

Engineering Mathematics-I

Course Code and Course Title	**0BSBS101 Engineering Mathematics-I**			
Semester	I			
Prerequisites	12th Class Mathematics			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	1	-	
Credit	04			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): -Upon successful completion of this course, the student will able to:		**BL**
CO1	**Solve** the system of linear equations by using matrix methods.	**3**
CO2	**Compute** Eigen values and Eigen vectors of a matrix, also determine the inverse and higher powers of a matrix by using the Cayley–Hamilton theorem.	**3**
CO3	**Solve** the simultaneous linear equations by using numerical methods.	**3**
CO4	**Understand** the concept of partial derivatives and use it to find Jacobian, Extrema and series expansion of functions of two variables.	**2**
CO5	**Apply** the concepts of complex numbers to solve mathematical expressions.	**3**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Linear Algebra – Matrices** Introduction, Rank of a matrix, Normal form of a matrix, Echelon form of a matrix, Consistency of non- homogeneous and homogeneous system of linear equations.	**7**
Unit 2	**Eigen Values and Eigen Vectors** Introduction, Definition of Eigen values and Eigen vectors, Properties of Eigen values and Eigen vectors; Cayley- Hamilton's theorem and its applications.	**6**
Unit 3	**Numerical Solution of System of Simultaneous Linear Equations** Introduction, Elimination Method - Gauss Elimination Method and Gauss-Jordan Method, Iterative Method - Gauss Jacobi Method and Gauss Seidel Method	**6**
Unit 4	**Partial Differentiation** Introduction, Partial derivatives of first and higher orders; Total derivatives, change of variables, Homogeneous functions – Euler's Theorem for functions containing two variables.	**7**
Unit 5	**Applications of Partial differentiation** Introduction, Jacobians and its properties; Taylor's and Maclaurin's theorems for functions of two variables; Maxima and minima of functions of two variables.	**6**
Unit 6	**Complex Numbers** Introduction, De-Moivre's theorem, Roots of complex numbers, Hyperbolic functions; Relations between circular and hyperbolic functions; Real and imaginary parts of circular and hyperbolic functions; Logarithm form of Complex quantities.	**7**
	Total Hours	**39**

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List of Tutorials		
Tutorial No.	**Title**	**Hrs.**
1	Examples on Rank of Matrix.	1
2	Examples on Solution of system of simultaneous linear equation.	1
3	Examples on Eigen Values and Eigen Vectors.	1
4	Examples on Cayley- Hamilton's theorem.	1
5	Examples on Numerical Solution of system of simultaneous linear equation.	1
6	Examples on Partial differentiation of higher orders.	1
7	Examples on Partial Differentiation of Homogeneous functions.	1
8	Examples on Applications of Partial Differentiation on Jacobians and Taylor's series.	1
9	Examples on Applications of Partial Differentiation on Maclaurin's series and Extreme function.	1
10	Examples on Complex Number.	1

Text Books:

1. **Engineering Mathematics – I**, B.B. Singh, Synergy Knowledgeware, 2013.
2. **Engineering Mathematics – II**, B.B. Singh, Synergy Knowledgeware, 2013.
3. **A Text of Applied Mathematics (Vol. I & II)**, P.N. Wartikar and J.N. Wartikar, Pune Vidyarthi Griha Prakashan, 1999.
4. **Higher Engineering Mathematics**, B.S. Grewal, Khanna Publishers, 41st Edition, 1965.

Reference Book:

1. **Advanced Engineering Mathematics**, Erwin Kreyszig, John Wiley and Sons, 9th Edition, 2006.
2. **Higher Engineering Mathematics**, B.V. Ramana, McGraw-Hill Publications, New Delhi, 2019.
3. **A Textbook of Engineering Mathematics**, Peter O'Neil, Thomson Asia Pvt. Ltd., Singapore, 7th Edition, 1983.
4. **Engineering Mathematics, Volume I**, Rakesh Dube, 2010.
5. **Engineering Mathematics, Volume II**, Rakesh Dube, 2010.

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Curriculum including Structure and Evaluation Scheme

To be implemented from Academic Year 2025-26

Engineering Physics

Course Code and Course Title	**0BSBS102 Engineering Physics**			
Semester	I and II			
Prerequisites	12th Class Physics			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	03			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	**Spell out** the basic phenomena of interference, polarisation and to relate its applications in the engineering field.	**2**
CO2	**Explain** the idea of Laser, optical fibres and to enumerate its applications.	**2**
CO3	**Describe** the crystal systems and origin of X-rays; and interpret wave-like behaviour of matter through quantum mechanics.	**2**
CO4	**Infer** the basic working principles of Ultrasonics and electron motion.	**1**
CO5	**Relate** the principles of semiconductors with the concept of Fermi level and interpret the magnetic behaviour.	**2**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Interference and Polarisation** **Interference-** Introduction, Interference in thin film and wedge-shaped films, Newton's Rings, applications of Newton's Rings. **Polarisation:** Introduction, Types of Polarization, Double refraction in uniaxial crystals, positive and negative crystals, Optical activity and Specific rotation.	8
Unit 2	**Laser and Optical Fibers** **Laser:-**Interaction of radiation with matter, Conditions for lasing action, Characteristics of lasers, He-Ne and Semiconductor laser, applications of laser. **Optical fibers:** Structure, total internal reflection, acceptance angle and its expression, numerical aperture, fractional refractive index change, advantages and applications of optical fibers.	7
Unit 3	**Crystal Structure and X-rays** **Crystal Structure-**Introduction, features of cubic crystal system, relation between lattice constant and density, Lattice planes and Miller indices, Interplaner spacing for cubic system.	6

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	X-rays -Line and Continuous Spectrum of X-ray, Bragg's law and its derivation, Mosley's law (no derivation), Importance of Mosley's law.	
Unit 4	**Quantum Physics** Properties of matter waves; Heisenberg Uncertainty Principle (only derivation), Wave function and its properties, Schrödinger's time independent and time dependent equations, Principles of quantum computing: concept of q-bit, applications of quantum computing.	6
Unit 5	**Ultrasonics and Electron Optics** **Ultrasonics:** - Introduction, Piezo-electric and Magnetostriction effect, Production of ultrasonic waves, properties of ultrasonic waves, Applications of ultrasonic waves **Electron Optics**-Motion of electron in Electric field and magnetic field, crossed fields, Bainbridge mass spectrograph	6
Unit 6	**Semiconducting and Magnetic Materials** **Semiconducting Materials**-Electrical conductivity of conductors and semiconductors, Fermi energy, Fermi level in semiconductors, dependence of Fermi level on temperature and doping concentration, Hall effect and its applications. **Magnetic materials-** Ferromagnetic Materials (Antiferromagnetic and Ferrimagnetic), B-H curve (Hysteresis), Ferrites, Applications of Magnetic materials.	6
	Total Hours	**39**

Text Books:

1. **Engineering Physics**, M.N. Avadhanulu and P.G. Kshirsagar, S. Chand and Company Ltd., Revised Edition, 2023.
2. **Engineering Physics**, R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications Pvt. Ltd., New Delhi, First Edition, 2015.
3. **Concepts of Modern Physics**, Arthur Beiser, Tata McGraw-Hill Publishing Company Limited, 6th Edition, 2002.

Reference Books:

1. **Optics**, Ajoy Ghatak, McGraw Hill Education (India) Pvt. Ltd., 8th Edition, 2023.
2. **An Introduction to Laser's Theory and Applications**, M.N. Avadhanulu and P.S. Hemne, Chand and Company Pvt. Ltd., Revised Edition, 2017.
3. **Introduction to Solid State Physics**, Charles Kittel, John Wiley and Sons, 7th Edition, 2021.
4. **Introduction to Quantum Mechanics**, David J. Griffiths and Darrell F. Schroeter, Cambridge University Press, 3rd Edition, 2018.
5. **Fundamentals of Physics**, Halliday and Resnick, Wiley Eastern Limited, 6th Edition, 2018.

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Curriculum including Structure and Evaluation Scheme

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Engineering Graphics

Course Code and Course Title	**0BSES103 Engineering Graphics**			
Semester	I and II			
Prerequisites	Basic geometric shapes and measurements			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	2	-	-	
Credits	02			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

	Course Outcomes (COs): Upon successful completion of this course, the student will able to:	**BL**
CO1	**Construct** projections of straight lines in various positions with reference planes, by variation in inclination, grade, bearing, and initial conditions.	**2**
CO2	**Complete** the projection of planes in various positions relative to reference planes, considering variations in initial conditions and inclination, to achieve an accurate shape in inclined positions.	**2**
CO3	**Draw** the three orthographic views for a given three-dimensional pictorial view, concerning the direction of viewing in first-angle projection, explaining the sectional view, hidden object and dimensions.	**3**
CO4	**Develop** a 3-dimensional isometric view converted from two or three orthogonal views to illuminate a 3D object.	**2**

Course Contents

Unit No.	**Contents**	**Hrs.**
Unit 1	**Fundamentals of Engineering Graphics and Projections of Lines** **Fundamentals of Engineering Graphics:** Introduction to Drawing instruments and their uses. Different types of lines used in drawing practice, Dimensioning system as per BIS. **Projections of Lines:** Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary reference planes. Projections of lines (horizontal, frontal, oblique and Profile lines) on regular and auxiliary reference planes. True length of a line, Point View of a line, angles made by the line with reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. Grade and Bearing of a line.	7

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Unit 2	**Projections of Planes** **Projections of Planes:** Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes), Edge view and True shape of a Plane. Angles made by the plane with the principal reference planes. Projections of plane figures inclined to both planes. (Only regular polygon).	6
Unit 3	**Orthographic Projections** Lines used, selection of views, spacing of views, dimensioning and sections. Drawing required views from given pictorial views (conversion of pictorial views into orthographic views), including sectional orthographic views.	7
Unit 4	**Isometric Projections** Introduction to isometric. Isometric scale, Isometric projections, and Isometric views/drawings. Circles in isometric view. Isometric views of simple solids and objects.	6
	Total Hours	**26**

***Use only First angle method**

Text Books:

1. **Engineering Drawing.** By Dhananjay Johle. Revised ed., Tata McGraw-Hill, 2011.
2. **Engineering Drawing & Graphics.** By M. L. Mathur. Revised ed., Jain Brothers, 1999.
3. **Fundamentals of Engineering Drawing.** By W. J. Luzadder. Revised ed., Prentice Hall of India, 1999.
4. **Machine Drawing.** By N. D. Bhatt. 15th ed., Charotar Publishing House Pvt. Ltd., 2007.

Reference Books:

1. **A Textbook of Engineering Drawing.** By R. K. Dhawan. Revised ed., S. Chand and Co., 2008.
2. **Engineering Drawing.** By N. B. Shaha and B. C. Rana. 2nd ed., Pearson Education, 2012.
3. **Engineering Drawing and Graphics.** By K. Venugopal. 5th ed., New Age Publication, 2004.
4. **Machine Drawing.** By K. L. Narayana. New Age Publication.

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Curriculum including Structure and Evaluation Scheme
To be implemented from Academic Year 2025-26

Basic Electrical and Electronics Engineering

Course Code and Course Title	**0BSES104 Basic Electrical and Electronics Engineering**			
Semester	I and II			
Prerequisites	12th Class Physics			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	2	-	-	
Credit	02			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): -Upon successful completion of this course, the student will able to:		**BL**
CO1	**Apply** Ohm's Laws and Kirchhoff's law s to analyze simple resistive circuits.	**2**
CO2	**Explain** diode and transistor-based circuits.	**2**
CO3	**Elaborate** single-phase AC circuits and three-phase circuits.	**2**
CO4	**Demonstrate** the various number systems and basic logic gates,	**2**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Basic Concepts** Concept of Current, Voltage and Resistance, Capacitor, Inductor, Ohm's Law, Series and Parallel Circuit, Equivalent Resistance, Open Circuits, Short Circuits, Kirchhoff's Laws- KCL and KVL, Sign Convention, Illustration of Kirchhoff's Laws.	6
Unit 2	**Semiconductor Diode and Transistor** **Diode:** PN Junction diode, Construction, Symbol, working principle- Forward and reverse biasing, V-I characteristics, applications, Diode as a rectifier –Half-wave and Full-wave rectifier (Centre-tapped and bridge), Capacitor filter, Zener diode characteristics, zener diode as a voltage regulator. Block diagram description of a dc power supply. **Transistor**: BJT- PNP and NPN structure, biasing, regions of operation, Transistor configurations – CB, CE and CC, current gains, input and output characteristics, DC load line, Q-Point, Transistor as an amplifier in CE configuration.	7
Unit 3	**AC Circuits** **Single Phase**: Representation of sinusoidal waveforms, peak, RMS, average values, Form factor, Peak factor, real, reactive and apparent power. **Three Phase:** Three-phase balanced circuits, Voltage and current relations in star and delta configurations, Three Phase Power.	7
Unit 4	**Digital Electronics** Binary number system, Octal number system, Hexadecimal number system, Conversions - Decimal to binary, Binary to decimal, decimal to octal, octal to decimal,	6

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	decimal to hexadecimal, hexadecimal to decimal, Basic logic gates and truth tables– AND, OR and NOT.	
	Total hours	**26**

Text Books:

1. **Basic Electrical Engineering**, Rohit Mehta and V.K. Mehta, S. Chand, 11th Edition, 2008.
2. **Basic Electrical and Electronics Engineering**, D.P. Kothari and I.J. Nagrath, McGraw Hill, 2nd Edition, 2020.
3. **Principles of Electronics**, V.K. Mehta and Rohit Mehta, S. Chand and Company, 11th Edition, 2008.
4. **Applied Electronics**, R.S. Sedha, S. Chand and Company, 2nd Edition, 2019.

Reference Books:

1. **Electrical Engineering: Principles and Applications**, Allan R. Hambley, Pearson Education India, 6th Edition, 2016.
2. **Electrical Engineering Fundamentals**, Vincent Del Toro, Pearson Education India, 2nd Edition, 2015.

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Curriculum including Structure and Evaluation Scheme

To be implemented from Academic Year 2025-26

Indian Epistemology

Course Code and Course Title	**0BSIK105 Indian Epistemology**		
Semester	I and II		
Prerequisites	12th Class Physics and Mathematics		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	-
Credit	02		
Evaluation Scheme	ISE : 50 Marks		

Course Outcomes (COs):-Upon successful completion of this course, the student will able to:		**BL**
CO1	**Define** Indian Knowledge System and its importance.	**1**
CO2	**Summarize** contribution of Indian Mathematicians and Astronomers.	**2**
CO3	**Explain** the fundamentals of a spherical co-ordinate system.	**2**
CO4	**Relate** technology in ancient India with modern technology.	**2**

Course Content

Unit No.	**Contents**	**Hrs**
Unit 1	**Indian Knowledge System: An Introduction** Definition of Indian Knowledge System (IKS); Importance of Ancient Knowledge, the space and relevance of IKS, Vedic Corpus: Introduction to Vedas, Contents of Siddhant's.	7
Unit 2	**Indian Mathematics** Introduction to Indian Mathematics, Unique aspects of Indian Mathematics, Indian Mathematicians and their Contributions (Aryabhata-I), Number systems in India - Historical evidence, Algebra, Geometry, Trigonometry.	7
Unit 3	**Celestial Sphere, Coordinate System and Indian Panchang** **Celestial Sphere:** Introduction; Celestial Horizon, Meridian, Equator, Ecliptic. **Coordinate System:** Celestial Longitude and Latitude (Ecliptic System); Right Ascension and Declination (Equatorial System); Azimuth and Altitude (Horizontal System); Hour Angle and Declination (Meridian System). **Indian Panchang**- Tithi, Nakshatra, Yoga, Karana, Vara.	8
Unit 4	**Introduction to Technology in Ancient India** Indian Architecture and town planning, Indian rocketry, Shipbuilding, Metullargy and mining, Agriculture and water management.	4
	Total hours	**26**

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Text Books:
1. **IKS: The Knowledge System of Bhārata**, Bhag Chand Chauhan, Garuda Prakashan, 2023.
2. **Introduction to Indian Knowledge System: Concepts and Applications**, B. Mahadevan, V.R. Bhat, and R.N. Nagendra Pavana, PHI Learning, 1st Edition, 2022.
Reference Books:
1. **History of Astronomy in India**, S.N. Sen and K.S. Shukla, INSA, 2nd Edition, 2001.
2. **Indian Astronomy: An Introduction**, S. Balachandra Rao, Universities Press, 2000.
3. **Indian Astronomy: A Source Book**, B.V. Subbarayappa and K.V. Sarma, Nehru Centre, Bombay, 1985.
4. **History of Indian Mathematics**, C.N. Srinivasiengar, The World Press, Calcutta, 1967.

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Professional Communication Skills

Course Code and Course Title	**0BSAE106 Professional Communication Skills**		
Semester	I and II		
Prerequisites	12th Class English		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	2
Credit	03		
Evaluation Scheme	ISE : 50 Marks		

Course Outcomes (COs): -Upon successful completion of this course, the student will able to		**BL**
CO1	**Apply** principles of communication effectively in academic and professional settings.	3
CO2	**Demonstrate** improved oral communication skills in public speaking and presentations.	3
CO3	**Write** clear, structured, and error-free written content.	3
CO4	**Participate** actively and effectively in group discussions and interviews.	3

Course Content

Unit No.	Contents	Hrs.
Unit 1	**Essentials of communication** Communication and its Process, Types and Modes of Communication, Barriers to Communication, The 7 Cs of Effective Communication **Listening Skills**-Types of Listening, Barriers to listening, Improving listening comprehension **Speaking Skills**- Pronunciation, Fluency, Confidence, Body Language **Reading Comprehension** – Types of reading, Passage Comprehension	7
Unit 2	**Communication Skills** Art of Conversation, Extempore, Public Speaking, Group Discussion, Debate, Presentation Skills, Interview Techniques, Role-play.	6
Unit 3	**Phonetics** Introduction to Phonetics and Phonemic Symbols, Vowels, Consonants, and Diphthongs, Word Stress, Intonation and Rhythm	6
Unit 4	**Business Correspondence** Principles of Effective Writing, Email Protocol, Application/ Letter Writing, Report writing, Resume and Cover Letter Writing, Notices, Circulars, Agenda Writing, Summary and Note-Making.	7
	Total hours	**26**

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Experiment List (Any 10 performance are compulsory)		
Expt. No.	**Title**	**Hrs.**
1	Self-introduction and peer interaction.	2
2	Listening comprehension.	2
3	Extempore.	2
4	Conversational English.	2
5	Group discussion practice.	2
6	Debate.	2
7	Presentation.	2
8	Resume/CV writing and cover letter.	2
9	Email writing.	2
10	Mock interview.	2
11	Introduction to Phonetics and Phonemic Symbols, Vowels, Consonants, and Diphthongs.	2
12	Word Stress, Intonation and Rhythm.	2
13	Reading comprehension.	2
14	Role-play.	2
15	Portfolio creation.	2

Text Books:

1. **Communication Skills**, Sanjay Kumar and Pushp Lata, Oxford University Press, 2nd Edition, 2020.
2. **Technical Communication**, Meenakshi Raman and S. Sharma, Oxford University Press, 3rd Edition, 2017.
3. **Effective Technical Communication**, Mohd. Ashraf Rizvi, Tata McGraw Hill, 2nd Edition, 2017.

Reference Books:

1. **Business Communication**, M.K. Sehgal and Vandana Khetarpal, Excel Books, Latest Edition, 2021.
2. **The ACE of Soft Skills**, Gopalaswamy Ramesh, Pearson, 1st Edition, 2010.
3. **Communication Works**, Teri Kwale Gamble and Michael Gamble, Tata McGraw Hill Education, 1st Edition, 2010.
4. **Study Speaking: A Course in Spoken English for Academic Purposes**, Kenneth Anderson, Joan Maclean, and Tossny Lynch, Cambridge University Press, 1st Edition, 2004.
5. **Organisational Behaviour**, K. Aswathappa, Himalayan Publication, Mumbai, 1st Edition, 1991.
6. **Effective Credit Management**, N. Atreya and Guha, MMC School of Management, Mumbai, 1st Edition, 1994.
7. **Effective Communication**, K.R. Balan and C.S. Rayudu, Beacon, New Delhi, 1st Edition, 1996.

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Engineering Physics Laboratory

Course Code and Course Title	**0BSBS107 Engineering Physics Laboratory**		
Semester	I and II		
Prerequisites	12th Class Physics.		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credits	01		
Evaluation Scheme	ISE: - 50 Marks		

Course Outcomes (COS): -Upon successful completion of this course, the student will able to:		**BL**
CO1	**Compute** divergence and wavelength of laser light.	**3**
CO2	**Examine** electrical properties of semiconducting materials.	**3**
CO3	**Demonstrate** crystal structure, miller indices and light through optical fiber etc..	**3**
CO4	**Infer** inverse square law.	**2**
CO5	**Estimate** specific rotation of sugar solution.	**2**

Experiment List (Any 10 performance are compulsory)

Expt. No.	Title	Hrs.
1	Laser - Determination of wavelength of He-Ne laser light.	2
2	Half shade Polarimeter - Determination of specific rotation of optically active material.	2
3	Laser - Determination of divergence of He-Ne laser light.	2
4	Newton's rings - Determination of radius of curvature of Plano convex lens / wavelength of light.	2
5	Fibre optics-01 Detection of light through optical fiber and LED output as a function of current.	2
6	Fibre optics-02 Measurement of bending Loss.	2
7	Measurement of Band gap energy of Semiconductors.	2
8	Study of I-V characteristics of P-N junction diode.	2
9	Symmetry Elements of cubic crystal system.	2
10	Crystal Plane – Study of planes related Miller Indices.	2
11	Inverse Square Law -Verification.	2
12	B-H Curve Experiment.	2
13	Hall Effect - Determination of Hall Coefficient.	2

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Engineering Graphics Laboratory

Course Code and Course Title	**0BSES108 Engineering Graphics Laboratory**		
Semester	I and II		
Prerequisites	Basic geometric shapes and measurements		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credits	01		
Evaluation Scheme	ISE: - 50 Marks		

Course Outcomes (COs): Upon successful completion of this course, the student will able to:		**BL**
CO1	**Understand** the basics of engineering drawing.	**2**
CO2	**Apply** the methods of projections to prepare the drawings for lines, planes.	**3**
CO3	**Apply** the concept of orthographic and isometric projection to draw 2D/3D views of given objects.	**3**

Experiment List

Expt. No.	**Title**	**Hrs.**
1	Introduction to Engineering Drawing.	2
2	Types of Lines, Lettering and Dimension.	2
3	1. Projection of Line	2
4	2. Projection of Line	2
5	Projection of Plane.	4
6	Review.	2
7	Orthographic Projection.	2
8	Isometric Projection.	2
9	Review.	2
10	Final Submission.	2

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Basic Electrical and Electronics Engineering Laboratory

Course Code and Course Title	**0BSES109 Basic Electrical and Electronics Engineering Laboratory**		
Semester	I and II		
Prerequisites	12th Class Physics		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	01		
Evaluation Scheme	ISE : 50 Marks		

Course Outcomes (COs): -Upon successful completion of this course, the student will able to:		**BL**
CO1	**Calculate** the equivalent resistance of series and parallel connections and apply Kirchhoff's laws in electrical circuits.	3
CO2	**Understand** the relationship between phase and line quantities in star and delta connections.	2
CO3	**Study** the operation of diode as a rectifiers and voltage regulator and transistor as an amplifier.	2
CO4	**Verify** the functionality of AND, OR and NOT logic gates.	2

Experiment List

Expt. No.	**Title**	**Hrs.**
1	To calculate the equivalent resistance in series and parallel connections.	2
2	To Perform Kirchhoff's laws: KCL and KVL.	2
3	To Study the relation between Phase and Line voltage and current in Star	2
4	To Study the relation between Phase and Line voltage and current in Delta	2
5	To measure the active and reactive power in single phase AC circuits.	2
6	To Study various types of lamps.	2
7	To study the basic electronics components and measuring devices.	2
8	To study the VI characteristics of PN junction diode.	2
9	To study the full wave rectifier circuit.	2
10	To study the Zener diode as voltage regulator.	2
11	To study single stage CE amplifier.	2
12	To study the basic logic gates and verify the truth tables.	2

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Workshop Practices

Course Code and Course Title		**0BSVS110 Workshop Practices**		
Semester		I and II		
Prerequisites		Need Safety Awareness		
Teaching Scheme (hours per week)		**Lecture**	**Tutorial**	**Practical**
		-	-	2
Credit		01		
Evaluation Scheme		ISE : 50 Marks		
Course Outcomes (COs): -Upon successful completion of this course, the student will able to:				**BL**
CO1	**Demonstrate** the basic manufacturing processes, tools, equipment, and their applications in carpentry, fitting, welding, sheet metal, and machine shop.			**2**
CO2	**Perform** the basic workshop operations such as measuring, marking, cutting, joining, and finishing using appropriate hand tools and machines with safety precautions.			**3**
CO3	**Apply** the fabrication techniques, showcasing accuracy, workmanship, and practical skills to manufacture simple components or models.			**3**

Experiment List

Expt. No.	**Title**	**Hrs.**
1	A wood job sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint / cross lap joint etc.	6
2	A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M.S. plates.	6
3	Making a small part using GI sheet involving development, marking, cutting, bending, hemming, riveting operations – tray, waste pan etc.	6
4	A job using arc welding to make a square butt joint / tee joint etc.	6
5	Demo job on turning of a mild steel cylindrical job using center lathe.	2

Text Books:

1. **A Course in Workshop Technology**, B.S. Raghuvanshi, Dhanpat Rai and Sons, 1st Edition, 2007.
2. **Elements of Workshop Technology**, Hajra Choudhary, Media Promoters, 1st Edition, 2003.
3. **Workshop Technology**, Gupta and Kaushik, New Heights, 2nd Edition, 2001.
4. **Workshop Technology**, W.A.J. Chapman, English Language Book Society, 1st Edition, 2000.
5. **Workshop Technology**, H.S. Bawa, TMH Publications, 2nd Edition, 1998.
6. **Mechanical Workshop Practice**, K.C. John, Prentice Hall Publication, New Delhi, 1st Edition, 2002.

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Engineering Chemistry

Course Code and Course Title	**0BSBS111 Engineering Chemistry**			
Semester	I and II			
Prerequisites	12th Class Chemistry			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	03			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): -Upon successful completion of this course, the student will able to:		**BL**
CO1	**Use** relevant water treatment process to solve industrial problems.	**3**
CO2	**Explain** the causes of corrosion and **apply** suitable methods for corrosion control in industries.	**3**
CO3	**Apply** knowledge of batteries to solve engineering problems.	**3**
CO4	**Understand** the principles of instrumental techniques and their applications in material analysis.	**2**
CO5	**Select** suitable fuels, Lubricants and engineering materials for various applications.	**3**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Water Treatment** Introduction, Impurities in natural water, Water quality parameters-Hardness, Dissolved oxygen, Ill effect of hard water in various industries and boilers (Scale, Sludge),Numerical on Hardness of water, Softening of water- Ion exchange, Reverse osmosis (RO),Treatment of water for domestic purposes by Sedimentation, Coagulation and Sterilization.	8
Unit 2	**Corrosion and its prevention** Introduction, Causes, Classification: atmospheric corrosion, electrochemical corrosion, factors affecting rate of corrosion, prevention of corrosion by proper design and material selection, protective coating: hot dipping (galvanizing and tinning),metal spraying, cathodic protection	6
Unit 3	**Energy system and battery technology** Introduction, classification of batteries, Construction, working and applications of carbon-zinc cell, Ni-Cd and Li-ion batteries Fuel cells: Introduction, types of fuel cell,H_2-O_2 fuel cell	5

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Unit 4	**Instrumental Methods of Chemical analysis** A) UV Spectroscopy-Introduction, Beers-Lambert's law, Single beam spectrophotometer B) IR Spectroscopy-Introduction, Fundamental modes of vibrations, Instrumentation of IR spectrophotometer. Flame photometer, Scanning Electron Microscopy Chromatography-types, Gas liquid chromatography (GLC).	7
Unit 5	**Fuels and Lubricants** A) Fuels-Introduction, Calorific value and its types, Bomb calorimeter, Boy's calorimeter, Numerical problem on calorific value. B) Lubricants-Introduction, Classification, Physical properties (definition and significance) Viscosity, Viscosity index, Flash and Fire point, Cloud and Pour point, Chemical Properties-Acid value, Saponification value.	7
Unit 6	**Engineering materials** A) Polymer-Introduction, Classification of polymer, Thermosetting and Thermo softening plastic, Synthesis of Urea formaldehyde, PVC, Epoxy resin. B) Alloys-Introduction, definition, Plain carbon steel, stainless steel, Brass, Nichrome, Duralumin and Alnico. C) Nanomaterial's-Introduction, synthesis-Top down and bottom up, application of Nanomaterial's, Carbon nanotubes.	6
	Total hours	**39**

Text Books:

1. **Engineering Chemistry**, Jain and Jain, Dhanpat Rai, 15th Edition, 2010.
2. **A Textbook of Engineering Chemistry**, S.S. Dara and S.S. Umare, S. Chand and Company Ltd., New Delhi, 5th Edition, 2014.
3. **Engineering Chemistry**, Dr. A.K. Pahari and Dr. B.S. Chauhan, Laxmi Publications Ltd., New Delhi, 1st Edition, 2007.
4. **A Textbook of Engineering Chemistry**, Shashi Chawla, Dhanpat Rai and Co. (P) Ltd., 5th Edition, 2010.
5. **Engineering Chemistry**, Jain and Jain, Dhanpat Rai, 15th Edition, 2010.

Reference Books:

1. **Instrumental Methods of Chemical Analysis**, Chatwal and Anand, Himalaya Publishing House, New Delhi, 5th Edition, 2019.
2. **Engineering Chemistry**, Renu Bapna and Renu Gupta, MacMillan Publishers (India) Ltd., Delhi, 1st Edition.
3. **Engineering Chemistry**, O.G. Palanna, Tata McGraw Hill, 2nd Edition, 2009.
4. **Fundamentals of Analytical Chemistry**, D.A. Skoog, Cengage Learning, 9th Edition, 2013.

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Engineering Mechanics

Course Code and Course Title	**0BSES112 Engineering Mechanics**			
Semester	I and II			
Prerequisites	12th Class Physics			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	2	-	-	
Credits	02			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (COs): - Upon successful completion of this course, the student will be able to:		**BL**
CO1	**Determine** the resultant and moment of a given force system by using laws of forces.	**3**
CO2	**Calculate** reactive forces acting on beam and static bodies by using static equilibrium conditions.	**3**
CO3	**Compute** moment of Inertia of plane lamina by using principle of parallel and perpendicular axis theorem.	**3**
CO4	**Apply** dynamic equilibrium conditions and motion equations to rigid bodies by using principle of kinetics and kinematics respectively.	**3**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Concept of Force and its Applications:** Introduction to Engineering Mechanics, Characteristics of Force, Force system, Resolution and Composition of Forces, Laws of forces, Moment and Couple of a force, Resultant of a concurrent force system, Varignon's theorem.	06
Unit 2	**Concept of Equilibrium:** Concept of Equilibrium, Free Body Diagram, Lami's theorem, Concept of Static friction, Types of beams, Types of loads and supports, Analysis of simply supported beam using equilibrium condition.	07
Unit 3	**Moment of Inertia:** Concept of Centroid and Centre of gravity, Radius of gyration, Parallel and perpendicular axis theorem, Determination of Moment of Inertia of plane lamina.	07
Unit 4	**Kinetics and Kinematics:** **Kinetics:** Newton's laws of motion, Concept of dynamic friction, D'Alembert's Principle, Work-Energy principle. **Kinematics:** Motion Under gravity, Relative motion analysis based on motion diagram.	06
	Total hours	26

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Text Books:
1. **Engineering Mechanics**, S. Ramamrutham, Dhanpat Rai Publication Pvt. Ltd., 9th Edition, 2010.
2. **Engineering Mechanics**, R.S. Khurmi, S. Chand, Revised Edition, 2006.
3. **Engineering Mechanics**, R.K. Bansal and Sanjay Bansal, Laxmi Publications, 6th Edition, 2013.
4. **Engineering Mechanics**, S.B. Junnarkar, Charotar Publication, 16th Edition, 2011.
5. **Engineering Mechanics**, S.S. Bhavikatti, New Age International Pvt. Ltd., 4th Edition, 2012.
Reference Books:
1. **Engineering Mechanics**, Timoshenko and Young, McGraw Hill Publisher, 3rd Edition, 2006.
2. **Vector Mechanics for Engineers (Vol. I & II)**, F.P. Beer and E.R. Johnston, Tata McGraw Hill Education, 6th Edition, 2011.
3. **Engineering Mechanics: Statics and Dynamics**, Ferdinand Singer, Harper and Row Publication, 9th Edition, 2009.
4. **Fundamentals of Engineering Mechanics**, S. Rajasekaran, Vikas Publishing House Pvt. Ltd., 3rd Edition, 2005.

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Basic Civil and Mechanical Engineering

Course Code and Course Title	**0BSES113 Basic Civil and Mechanical Engineering**			
Semester	I and II			
Prerequisites	12th Class Science			
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**	
	2	-	-	
Credit	02			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO): Upon successful completion of this course, the student will be able to:		**BL**
CO1	**Understand** building materials, principles of planning, and property documents in construction.	**3**
CO2	**Explain** working principle of different types of power plant and internal combustion engine.	**2**
CO3	**Apply** basic Surveying and levelling methods for Civil Engineering works.	**3**
CO4	**Understand** application of different power transmission device and manufacturing processes.	**2**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Building Construction, Materials, Planning and Property Documents** Introduction to Civil Engineering branches, Role of Civil Engineer in construction activities, Applications of civil engineering to other allied branches. Basic properties and uses of key building materials: Bricks, Timber, Stone, Sand, Cement, Steel. Types of structures, building components, principles of planning. Introduction to property documents, land records, and construction permissions required for buildings.	7
Unit 2	**Introduction of Power Plants and I.C. Engine** Introduction of Power Plants: - Hydroelectric power plant, Thermal power plant, Nuclear Power plant. Introduction of I.C. Engine: - Terminology of IC Engine, Four Stroke Engine, Two Stroke Engine.	6
Unit 3	**Surveying and Levelling** Principles of surveying, distance and angular measurements. Chain survey: chaining, ranging, offsetting. Compass survey: bearings, systems, local attraction. Levelling:	6

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	concept of bench marks, reduced levels, contour. Application of GIS, GPS, Remote Sensing, and AI in Civil Engineering.	
Unit 4	**Introduction of Power Transmission device and Manufacturing Processes** Introduction of Gears, Belts and Chains, Types of Gear drives, belt drives, Chain Drives. Introduction and Types of couplings, Bearings. Metal Casting Process: Definition and classification of metal casting process, sand casting process, Metal Joining Process: Welding Process: Arc welding, TIG welding and MIG welding, Soldering and Brazing.	7
	Total hours	**26**

Text Books:

1. **Theory of Machines**, R.S. Khurmi and J.K. Gupta, S. Chand Publishing, 14th Edition, 2017.
2. **Elements of Workshop Technology**, Hajra Choudhary K., Media Promoters and Publisher, 14th Edition, 2015.
3. **Basic Civil Engineering**, G.K. Hiraskar, Dhanpat Rai Publications, 1st Edition, 2018.
4. **Introduction to Civil Engineering**, L.G. Gole, Mahu Publisher House, 4th Edition, 2005.
5. **Surveying (Vol I)**, S.K. Duggal, Tata McGraw Hill, 4th Edition, 2013.
6. **Theory of Machines**, S.S. Rattan, McGraw Hill, 6th Edition, 2013.
7. **Applied Thermodynamics**, R. Yadav, Central Publishing House, 3rd Edition, 2011.
8. **Mechanics of Materials**, Beer and Johnson, McGraw Hill, 6th Edition, 2013.

Reference Books:

1. **Power Plant Engineering**, P.K. Nag, McGraw-Hill Education, 4th Edition, 2008.
2. **Internal Combustion Engine**, V. Ganeshan, Tata McGraw-Hill Publication, 4th Edition, 2006.
3. **Production Technology**, R.K. Jain, Khanna Publishers, 17th Edition, 2001.
4. **Surveying and Levelling**, N.N. Basak, Tata McGraw Hill, 2nd Edition, 2017.
5. **Civil Engineering Drawing and House Planning**, Dr. B.P. Varma, Khanna Publishers, 13th Edition, 2018.
6. **Thermodynamics: An Engineering Approach**, Yunus A. Cengel and Michael Boles, McGraw-Hill, 9th Edition, 2015.
7. **Strength of Materials**, Jacob P. Den Hartog, Dover Publication Inc., 3rd Edition, 1961.

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Department of Basic Sciences and Engineering

Curriculum including Structure and Evaluation Scheme
To be implemented from Academic Year 2025-26

Integrated Personality Development

Course Code and Course Title	**0BSCC114 Integrated Personality Development**		
Semester	I and II		
Prerequisites	-		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	1	-	-
Credit	01		
Evaluation Scheme	ISE : 50 Marks		

Course Outcomes (COs): -Upon successful completion of this course, the student will be able to:		**BL**
CO1	**Explain** the fundamental concepts of personal growth, self-management, and being addiction-free, and recognize their importance in daily life.	**2**
CO2	**Summarize** the values, responsibilities, and ethical principles of an ideal citizen, and explain the role of youth in nation-building.	**2**
CO3	**Apply** teamwork, collaboration, and professional harmony skills in real-life and academic situations, demonstrating effective interpersonal communication.	**3**
CO4	**Explain** financial planning, stress management, and health-related strategies, and apply them to enhance personal and professional productivity.	**2**
CO5	**Interpret** timeless wisdom and leadership principles, and apply them to solve contemporary challenges in personal and professional contexts.	**3**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit-1	**Remaking Yourself (Personal Growth and Self-Management)** **Begin with the End in Mind** – Visualizing goals, structuring life through SMART goals. **Being Addiction-Free** – Describe the importance of remaining free from addiction and identify strategies to maintain healthy habits. **Stress Management** – Coping with causes of stress for stability and focus. **Better Health, Better Future** – Role of health, exercise, diet, and sleep in productivity. **Impact of the Company** – Influence of peers and creating a positive environment.	5
Unit-2	**Values, Citizenship and Nation-Building** **Present Scenario: My India My Pride** – Role of youth in transforming India. **An Ideal Citizen – I** – Values of responsibility and integrity. **An Ideal Citizen – II** – Values of loyalty, sincerity, punctuality, and excellence.	3
Unit-3	**Soft Skills for Professional and Daily Life** **Teamwork and Harmony** – Six steps of teamwork, collaboration, and professional harmony. **Financial Planning** – Practical skills for financial stability and responsibility. **Forgive and Forget** – Importance of forgiveness in relationships and leadership.	3

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Unit-4	**Learning from Legends and Facing Challenges** **Leading Without Leading** – Humility and service-oriented leadership. **Timeless Wisdom for Daily Life** – Applying ancient wisdom to modern problems.	2
	Total hours	13

Workbook:

1. **IPDC Workbook 2 (English).** By IPDC Team, 1st ed., Swaminarayan Aksharpith, 2021.

Reference books:

1. **Covey, Stephen R.** The 7 Habits of Highly Effective People. Franklin Covey, 1989.
2. **Carnegie, Dale.** How to Win Friends & Influence People. Simon & Schuster, 1936.
3. **Dweck, Carol S.** Mindset: The New Psychology of Success. Ballantine Books, 2006.
4. **Clear, James.** Atomic Habits. Avery, 2018.
5. **Goleman, Daniel.** Emotional Intelligence. Bantam Books, 1995.
6. **Tolle, Eckhart.** The Power of Now. *New* World Library, 1997.

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Problem Solving Through Programming in C

Course Code and Course Title	**0BSES115** **Problem Solving Through Programming In C**		
Semester	I and II		
Prerequisites	-		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	2	-	2
Credit	03		
Evaluation Scheme	ISE: 50 Marks		

	Course Outcomes (COs): -Upon successful completion of this course, the student will able to:	**BL**
CO1	**Define** the fundamental concepts of C programming.	**1**
CO2	**Explain** the structure of C programs, algorithms, and flowcharts.	**2**
CO3	**Classify** different control statements (branching and looping) used in C.	**3**
CO4	**Demonstrate** the use of arrays, strings, and pointers in solving problems.	**3**
CO5	**Implement** functions, structures, and file handling techniques in C programs.	**3**

Course Content

Unit No.	**Contents**	**Hrs**
Unit 1	**Basics of C programming language** Introduction of C, History and features of C, Basic structure of C program, Algorithm, Flowchart, Data type, Tokens- Identifiers, Keywords, Constants, Operators, Special characters and strings, Formatted input/output function, Reading/Writing characters, Error Handling. **Types of Operators and Expressions** Arithmetic operators, relational and logical operators, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and associativity of operator, order of evaluation, type conversions.	8
Unit 2	**Branching statements and Loop in C** **Branching statements:** if, if-else Statement, Nested if-else, if-else ladder, Switch statements, **Loop in C:** while loop, do-while loop, for loop, break and continue statements	7
Unit 3	**Arrays and pointer in C** **Arrays: Concept** of array, One dimensions arrays; Multi dimensions arrays-Two dimensional arrays, Reading string from terminal, Writing string to screen, String handling functions. **Pointers:** Pointer basics, pointer arithmetic, pointers and arrays, pointers to functions. Dynamic memory allocation (malloc, calloc, realloc, free).	6

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Unit 4	**Functions and Structures in C** **Functions**: Function definition, Advantage of function, Types of function- built-in function, User defined function, Categories of function. **Structures:** Basics of structures, structures and functions arrays of structures, Pointers in structures.	5
	Total hours	**26**

Experiment List

Expt. No	Title	Hrs.
1	Program using formatted input/output statements and data types.	2
2	Program using different operators and demonstrate precedence of operators.	2
3	Program using branching statements. (if, if-else, if-else ladder, nested if-else).	2
4	Program with switch statements.	2
5	Program to demonstrate working of looping construct.(while ,do-while, for)	2
6	Program to work with 1D array.	2
7	Program to exercise 2 D array.	2
8	Program to experiment with string handling functions.	2
9	Program to work with structures.	2
10	Program to demonstrate pointers.	2
11	Program to work pointer in structure.	2
12	Program to show basic operations in file handling.	2

Text Books:

1. **Let Us C**, Yashwant Kanetkar, 19th Edition, 2007.
2. **Computing Fundamentals and C Programming**, E. Balagurusamy, 2nd Edition, 2017.
3. **Programming with C**, R.S. Bichkar, Orient Blackswan, 1st Edition, 2012.

Reference Books:

1. **The Fundamentals of Computer**, V. Rajaraman, 3rd Edition.
2. **The C Programming Language**, Brian W. Kernighan and Dennis M. Ritchie, 2nd Edition.
3. **How to Solve it by Computer**, R.G. Dromey, Pearson Education, 16th Edition, 2006.
4. **Programming with C**, Gottfried, Tata McGraw Hill, 3rd Edition, 2018.

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Design Thinking

Course Code and Course Title			**0BSVS116** **Design Thinking**	
Semester			I and II	
Prerequisites			None	
Teaching Scheme (hours per week)		**Lecture**	**Tutorial**	**Practical**
		1	-	2
Credit			02	
Evaluation Scheme			ISE : 50 Marks	
Course Outcomes (COS): -Upon successful completion of this course, the student will able to:				**BL**
CO1	**Explain** learning, memory management, and fundamentals of design thinking with stages.			**2**
CO2	**Apply** empathy tools to identify user needs and frame problem statements.			**3**
CO3	**Demonstrate** ideation techniques to generate and evaluate ideas.			**3**
CO4	**Develop** prototypes, conduct user testing, and assess validation outcomes.			**2**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Foundations of Learning, Memory, and Design Thinking** Types of learning and memory management. Basics of design thinking: definition of design thinking, need for design thinking, objective of design thinking, design Vs design thinking. Stages of design thinking process (explain with examples) – Empathize, Define, Ideate, Prototype, Test.	4
Unit 2	**Empathy in Design Thinking: Understanding Users and Defining Needs** Empathy: Role of empathy in design thinking, methods and tools of empathy. Explore define phase state users' needs and problems using empathy methods.	3
Unit 3	**Creative Thinking and Ideation** **Principles, Methods, and Practices** Introduction to Ideation: Ideation methods, brain storming, advantages of brain storming, rules for brainstorming. Methods and tools of ideations.	3
Unit 4	**Prototyping and User Testing in Design Thinking** Prototyping and methods of prototyping, phases of prototyping, User testing methods, Advantages and disadvantages of user testing/ validation.	3
	Total hours	13

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Experiment List		
Exp. No	**Title**	**Hrs.**
1	Activity: Kolb learning style – find the learning style of the student.	2
2	To understand the memory process and memory enhancement techniques.	2
3	To apply the method of Empathize and create an empathy map.	2
4	Activity: Conduct user interviews / observation to gather insights (Empathize extended).	2
5	To apply the Define phase: frame the problem as User + Need + Insight.	2
6	To finalize the problem statement: plot the problems on Impact vs Feasibility chart.	2
7	To apply the methods of Ideate phase – Experiment 1: Divergent thinking (Brainstorming, Brainwriting, SCAMPER).	2
8	To apply the methods of Ideate phase – Experiment 2: Convergent thinking (Mind Mapping, Crazy 8's, Role Storming).	2
9	To apply the method of Prototype – Low-fidelity prototype (paper sketches, models).	2
10	To apply the method of Prototype – High-fidelity prototype (digital mock-up, working model).	2
11	To use methods of Testing – test prototypes with real users, collect feedback, iterate.	2
12	Activity: Present the solution using storytelling method + fine tuning and submission of project report.	2
Reference Books/ Text Books:		
1. **Karmic Design Thinking**, Prof. Bala Ramadurai, Self-Published, 2020.		
2. **Design Thinking for Strategic Innovation**, Idris Mootee, John Wiley and Sons, 1st Edition, 2013.		
3. **Design Thinking for Dummies**, Christian Muller-Rotenberg, Wiley, 1st Edition, 2020.		
4. **Solving Problems with Design Thinking: Ten Stories of What Works**, Jeanne Liedtka, Andrew King, Kevin Bennett, Columbia Business School Publishing, 1st Edition, 2013.		

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Curriculum including Structure and Evaluation Scheme
To be implemented from Academic Year 2025-26

Engineering Chemistry Laboratory

Course Code and Course Title	**0BSBS117 Engineering Chemistry Laboratory**		
Semester	I and II		
Prerequisites	12th Class Chemistry		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	01		
Evaluation Scheme	ISE 50 Marks		

	Course Outcomes (COs): -Upon successful completion of this course, the student will able to:	**BL**
CO1	**Apply** volumetric methods to test the quality of water for industrial and domestic purposes.	**3**
CO2	**Estimate** rate of corrosion in acidic and alkaline medium by weight loss method.	**3**
CO3	**Use** chromatography and spectrophotometry techniques to separate and identify chemical substances.	**3**
CO4	**Examine** lubricants, fuels and alloys for their properties and applications in engineering.	**3**
CO5	**Demonstrate** the preparation of simple polymers.	**3**

Experiment List (Any 11 performance are compulsory)

Expt. No.	**Title**	**Duration in Hrs.**
1	Determination of Hardness of water sample by EDTA method.	2
2	Determination of Chloride content in water sample by precipitation titration method.	2
3	Determination of Dissolve Oxygen in water by Iodometric method.	2
4	To determine the Alkalinity water sample.	2
5	To determine the Acidity of the water sample.	2
6	Estimation of rate of corrosion of aluminum in acidic and alkaline medium.	2
7	To determine the maximum wavelength of absorption of a given solution by colorimeter.	2
8	Paper Chromatography.	2
9	To determine Calorific value of a fuel.	2
10	Determination of Viscosity.	2
11	Determination of Acid value of an oil sample.	2
12	Determination of pH of sample solution by pH meter.	2
13	Determination of Percentage of Copper in brass.	2
14	Preparation of Urea Formaldehyde	2

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Engineering Mechanics Laboratory

Course Code and Course Title	**0BSES118 Engineering Mechanics Laboratory**		
Semester	I and II		
Prerequisites	12th Class Physics.		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credits	01		
Evaluation Scheme	ISE: - 50 Marks		

Course Outcomes (COs): -Upon successful completion of this course, the student will able to:		**BL**
CO1	**Compute** resultant and moment of a force on static bodies by verification of the laws of forces.	**3**
CO2	**Relate** graphical, analytical and experimental method for the support reaction of a simply supported beam.	**3**
CO3	**Calculate** coefficient of friction for different material surfaces.	**3**
CO4	**Locate** centroid of irregular shaped lamina by experimental method.	**2**
CO5	**Classify** the types of collision of elastic bodies.	**2**

Experiment List (Any 8 performance are compulsory)

Expt. No.	**Title**	**Duration in Hrs**
1	Jib Crane	2
2	Polygon law of coplanar forces	2
3	Bell crank lever.	2
4	Simply supported beam.	2
5	Determination of beam reaction by graphical method	2
6	To determine coefficient of friction for the body resting on a level surface.	2
7	To determine coefficient of friction for the body resting on an inclined surface.	2
8	Lami's Theorem.	2
9	Collision of elastic bodies (Law of conservation of momentum)	2
10	Locate Centroid of irregular shaped lamina.	2

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Basic Civil and Mechanical Engineering Laboratory

Course Code and Course Title	**0BSES119 Basic Civil and Mechanical Engineering Laboratory**		
Semester	I and II		
Prerequisites	12th Class Sciences		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	-	-	2
Credit	01		
Evaluation Scheme	ISE: 50 Marks		

Course Outcomes (COs): -Upon successful completion of this course, the student will be able to:		**BL**
CO1	**Perform** basic surveying operations such as distance measurement, traversing, and levelling for civil engineering applications.	3
CO2	**Demonstrate** fundamental building drawing skills by preparing sheets of essential building elements.	3
CO3	**Describe** the Component, working principle of different power plant and internal combustion engine.	2
CO4	**Demonstrate** different types of power transmission devices.	3

Experiment List (Any 10 performance are compulsory)

Expt. No.	**Title**	**Hrs**
1	Introduction to Measurement of Distances.	2
2	Plotting the outlines of a building by chaining, ranging and offsetting.	2
3	Plotting of closed traverse by prismatic compass.	2
4	Determination of Reduced Levels by using dumpy level (Use of Collimation Plane and Rise and Fall method)	2
5	Finding out the gradient of a line by using rise and fall method	2
6	Drawing sheet showing various building elements.	2
7	Study and demonstration of the Thermal power plant.	2
8	Study and Demonstration of the Hydro Power Plant.	2
9	Study and Demonstration of 4 stroke engine.	2
10	Study and Demonstration of 2 Stroke Engine	2
11	Study and Demonstration of type of belt drive and gear trains.	2
12	Study and Demonstration of couplings.	2

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An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

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Department of Basic Sciences and Engineering

Curriculum including Structure and Evaluation Scheme

To be implemented from Academic Year 2025-26

Engineering Mathematics – II

Course Code and Course Title	**0BSBS120 Engineering Mathematics – II**		
Semester	II		
Prerequisites	12th class Mathematics		
Teaching Scheme (hours per week)	**Lecture**	**Tutorial**	**Practical**
	3	1	-
Credit	04		
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Trace** the curves in Cartesian and Polar coordinate system and evaluate definite integral by using reduction formulae.	**2**
CO2	**Evaluate** multiple integrals and use it to find area enclosed by curves.	**3**
CO3	**Apply** the concepts of scalar and vector fields to analyze physical and engineering problems involving solenoidal and irrotational fields.	**2**
CO4	**Solve** linear differential equations with constant coefficients using standard methods, also find orthogonal trajectories of given curves and simple electric circuit problems.	**3**
CO5	**Apply** numerical methods to solve first-order, first-degree ordinary differential equations.	**3**

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Curve Tracing and Reduction Formulae** Introduction, Reduction Formulae for $\int_0^{\frac{\pi}{2}} sin^n x\ dx$, $\int_0^{\frac{\pi}{2}} cos^n x\ dx$ and $\int_0^{\frac{\pi}{2}} sin^m x\ cos^n x\ dx$ (m and n are positive integers). Rules for Tracing curves in Cartesian forms and Polar forms.	**6**
Unit 2	**Multiple Integrals and its Applications** Evaluation of double and triple integral in Cartesian and polar co-ordinates, Evaluation of double integrals by change of order and change Cartesian to polar form. Application of multiple integrals to find area of curve by using double integrals	**7**
Unit 3	**Vector Calculus** Introduction, Scalar and vector fields: Gradient, Divergence and curl, Solenoidal and Irrotational vector fields, Vector identities.	**6**
Unit 4	**Ordinary differential equation of First Order and First Degree and its Applications** Introduction, Linear Differential Equation, Reducible to Linear Differential Equation, Exact Differential Equations, Reducible to Exact Differential Equations, Orthogonal trajectories, Application of simple electric circuit.	**7**

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Unit 5	**Linear Differential Equation with Constant Coefficients** Introductory Remarks-Complementary Function, Particular Integral, Rules for finding Complementary Function and Particular Integrals, Method of Variation of Parameters, Cauchy Homogeneous Equations.	**6**
Unit 6	**Numerical Solution of Ordinary Differential Equation of First Order and First Degree** Introduction, Numerical solution by Picard's Method, Euler's Method, Modified Euler's Method and Runge- Kutta Second Order and Fourth Order Method.	**7**
	Total hours	**39**

Tutorial List

Tutorial No.	Title	Hrs.
1	Examples on Reduction Formulae.	1
2	Examples on Curve Tracing.	1
3	Examples on Multiple Integrals.	1
4	Examples on Application of Multiple Integrals.	1
5	Examples on Vector Calculus.	1
6	Examples on Ordinary Differential Equations of First Order and First Degree.	1
7	Examples on Applications of Ordinary Differential Equations of First Order and First Degree.	1
8	Examples on Linear Differential Equation with Constant Coefficients.	1
9	Examples on Linear Differential Equation with Variable Coefficients.	1
10	Examples on Numerical Solution of Ordinary Differential Equations of First Order and First Degree.	1

Text Books:

1. **Engineering Mathematics-I**, Dr. B.B. Singh, Synergy Knowledgeware, 2013.
2. **Engineering Mathematics-II**, Dr. B.B. Singh, Synergy Knowledgeware, 2013.
3. **A Textbook of Applied Mathematics**, P.N. Wartikar and J.N. Wartikar, Pune Vidyarthi Griha Prakashan, 1st Edition, 2008.
4. **Higher Engineering Mathematics**, B.V. Ramana, Tata McGraw Hill Publication, 6th Edition, 2010.
5. **Numerical Methods in Engineering and Science**, Dr. B.S. Grewal, Khanna Publication, 9th Edition, 2010.

Reference Books:

1. **Advanced Engineering Mathematics**, Erwin Kreyszig, Wiley Publishers, 10th Edition, 2017.
2. **Higher Engineering Mathematics**, Dr. B.S. Grewal, Khanna Publishers, 44th Edition, 1965.
3. **A Text Book of Engineering Mathematics**, Peter O'Neil, Thomson Asia Pvt. Ltd., Singapore, 7th Edition, 1983.
4. **Linear Algebra**, Seymour Lipschutz and Marc Lars Lipson, McGraw-Hill, 4th Edition, 2009.
5. **Numerical Methods**, Dr. P. Khadhasamy, Dr. K. Thilagavathy, Dr. K. Gunavathi, S. Chand, 1st Edition, 2010.
6. **Advanced Engineering Mathematics**, Erwin Kreyszig, Wiley Publishers, 10th Edition, 2017.

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